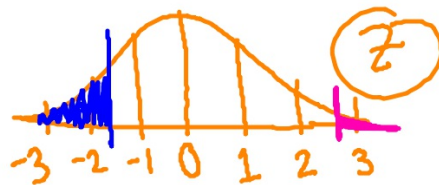


End of 3.2 notes:

Remember, Z-scores are $N(0, 1)$



1) I have an observation that has a Z-score of -1.7. What percent of the data is below it?

$$P(Z < -1.7) = \text{normcdf}(-\infty, -1.7, 0, 1) = 4.457\%$$

2) I have an observation that has a Z-score of 2.8. What percent of the data is above it?

$$P(Z > 2.8) = \text{normcdf}(2.8, \infty, 0, 1) = 0.256\%$$

3) What Z-score has 10% of the data below it?



4) What Z-score has 20% of the data above it?



$$\text{invnorm}(0.80, 0, 1)$$

$$z = 0.842$$

$$\text{invnorm}(0.10, 0, 1)$$

$$Z = -1.282$$

5) I have a distribution that is $N(150, 12)$.

(a) What percent of the data is below 135?

$$P(X < 135) = \text{normcdf}(-E99, 135, 150, 12)$$

(b) What is the Z score for 135?

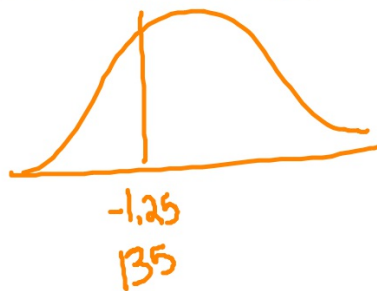
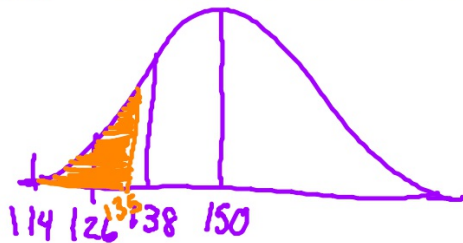
$$Z = \frac{135 - 150}{12} = -1.25$$

$$= 10.56\%$$

(c) What percent of the data is below the Z-score you found in letter (b)? Remember, Z scores are $N(0,1)$.

$$P(Z < -1.25) = \text{normcdf}(-E99, -1.25, 0, 1) = 10.56\%$$

(d) What do you notice about your answers to (b) and (c)?



6) I have a NEW distribution that is Normal. The observation of 30 has 20% of the data below it.

(a) I want to find the Z-score for the observation of 30. What percent of the data would be below the Z-score for 30?

(b) Find the Z-score for the observation of 30.

(c) We know that the mean of the distribution is 50, but we don't know the std. deviation. Use the Z-score formula for the observation of 30, and your answer in (b) to find the std. dev.



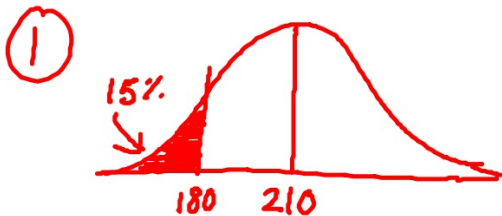
$$Z = \frac{X - \mu}{\sigma}$$
$$-0.842 = \frac{30 - 50}{\sigma}$$

$$\sigma \cdot -0.842 = \frac{30 - 50}{\sigma} \quad \text{.}$$

$$\frac{-0.842 \cdot \sigma}{-0.842} = \frac{-20}{-0.842}$$

$$\sigma = 23.753 \text{ units}$$

7) I have a distribution that has a mean of 210 and 15% of the data is below the point 180. What is the std. deviation?



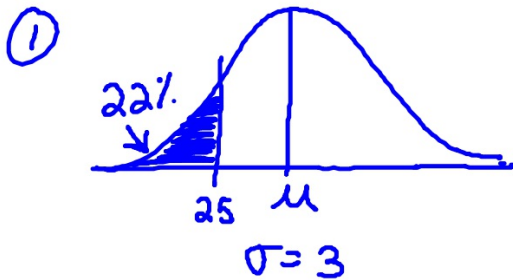
②
$$z = \frac{x - \mu}{\sigma}$$
$$= \frac{180 - 210}{\sigma}$$

③
$$z = \text{invnorm}(0.15, 0, 1)$$
$$z = -1.036$$

④
$$-1.036 = \frac{180 - 210}{\sigma}$$

⑤
$$\sigma = 28.958 \text{ mits}$$

8) I have a distribution that has a std. deviation of 3 and 22% of the data is below the point 25. What is the mean? (find the Z-score or the point 25, then work backwards using the Z-score formula)



②
$$Z = \frac{X - \mu}{\sigma}$$

$$3 \cdot -0.772 = \frac{25 - \mu}{3}$$

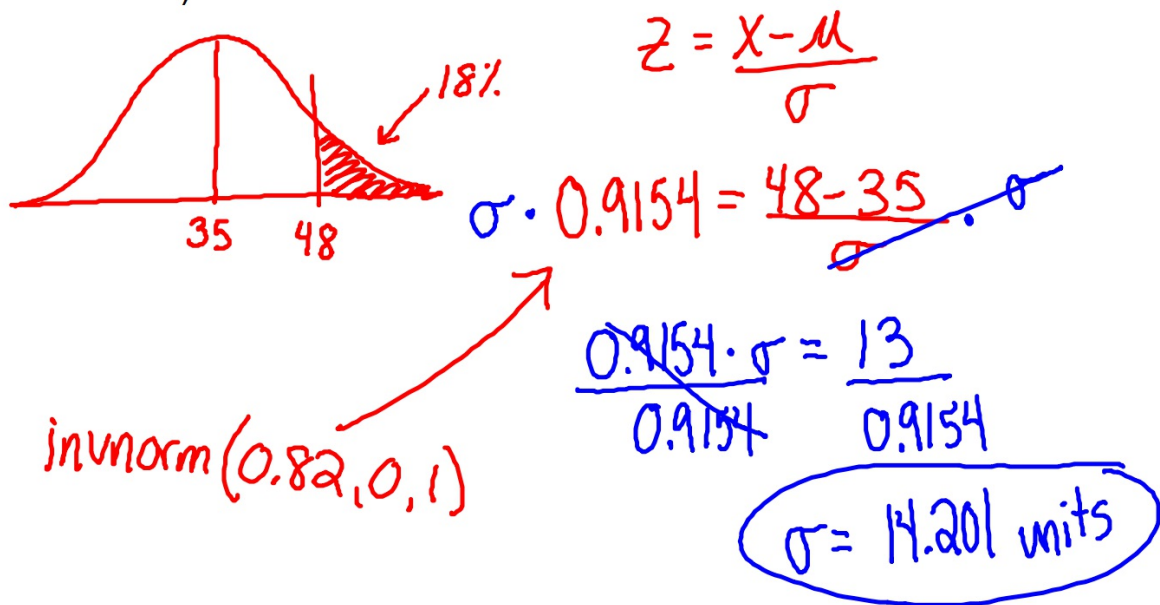
$$Z = \text{invnorm}(0.22, 0, 1) =$$

$$\mu = 27.316 \text{ units}$$

$$\begin{array}{rcl} -2.316 & = & 25 - \mu \\ -25 & & -25 \end{array}$$

$$-27.316 = -\mu$$

9) I have a distribution that has a mean of 35 and 18% of the data is above the point 48. What is the std. deviation?
 (find the Z-score or the point 48, then work backwards using the Z-score formula)



Complete 3.2 Classwork

- Std. dev. of 8.
- 23% of data is above the obs. 43.
- Find mean.



$$0.7388 = \frac{43 - \mu}{8}$$

$$\mu = 37.089 \text{ units}$$